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10/695,620	10/27/2003	Alexander Kadyshevitch	PDC/6967.PO2	3908

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EXAMINER	
VANORE, DAVID A	
ART UNIT	**PAPER NUMBER**
2881	

DATE MAILED: 07/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

M·A

Office Action Summary	Application No.	Applicant(s)	
	10/695,620	KADYSHEVITCH ET AL.	
	Examiner	Art Unit	
	David A. Vanore	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 July 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 October 2003 and 14 July 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Arguments

The examiner thanks the applicant for the newly submitted drawing and the properly submitted IDS containing that information considered relevant to the instant application. The objection to the drawings and the specification have been withdrawn with respect to those grounds.

The IDS is being considered in the instant Office action.

Applicant's arguments with respect to claims 1-38 concerning the 35 U.S.C. 102(e) and 35 U.S.C. 103(a) rejections discussed at pages 12-13 of the response have been considered but are moot in view of the new ground(s) of rejection.

Applicant's arguments are based on a limitation not previously presented. This newly submitted limitation has required the new grounds of rejection with respect to the claims and is detailed below.

The provisional Double patenting rejection of claims 1, 2, 4-6, 10, 13-19, 21-23, 27, and 30-38 is maintained. The newly added limitation functionally requires the beam to be angled sufficiently relative to the contact opening to strike a sidewall of a contact opening. Claims 13, 32, and 43-44 encompass the function of the newly added limitation.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "deviation in angle is greater than arc tan (1/AR), wherein AR is the ratio of depth to diameter of the one or

more contact openings" recited in claims 1, 18, 35, and 37 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1, 2, 4-6, 10, 13-19, 21-23, 27, and 30-38 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 10, 13, 15-16, 172, 177, and 179 of copending Application No. US2004/0021076A1. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

Regarding claims 1 and 15, copending claims 1 and 13 require all the limitations of pending claims 1 and 15 with various differences in language, but not in scope. For example, while claim 1 requires that a beam of charged particles be directed at an angle substantially deviant from the surface normal of the sample towards said openings on said sample, copending claim 1 requires that charged particles irradiate openings on said sample and claim 13 requires that the beam be angled substantially deviant from the surface normal of the specimen. Further, claim 1 requires that a map be created of a region of a sample based on a measured specimen current. Copending claim 1 measures the specimen current to produce an etch indicator signal. This etch indicator signal is then used to analyzed and assess a characteristic of the etch process producing a plurality of test openings. One characteristic would be the position of the test openings. If the position of the test openings is assessed, one has functionally

created a map of said test openings. Despite the difference in wording, claims 1 and 15 are unpatentable over copending claims 1 and 13.

Regarding claim 2, claim 2 requires that a measured secondary electron current be utilized along with a measured specimen current to create the map of the contact openings of claim 1. Copending claim 1 sets forth that at least one of specimen current and secondary electrons emitted from the surface of the sample produce the etch indicator above. The language "at least one" provides for the use of both the emitted electrons and the specimen current to assess a characteristic of the etch process as explained above. Claim 2 is therefore unpatentable over copending claim 1.

Regarding claim 4, copending claim 1 requires that a characteristic of contact openings be assessed. A depth or height of a contact opening fall into this requirement.

Regarding claims 5 and 6, claims 5 and 6 require the assessment of non-uniformities on the sample. Copending claim 10 requires the assessment of the uniformity of the sample after etching. Therefore, claims 5 and 6 are unpatentable over copending claim 10.

Regarding claim 10, claim 10 defines the sample to be a semiconductor wafer. Copending claim 1 requires a sample which is at least partially conductive, and therefore encompasses a semiconductor. Note further copending claim 16.

Regarding claims 13 and 14, copending claim 1 requires the testing of "contact openings" where contact openings are defined to include contact holes and trenches at paragraph 32 of the copending application. Further note copending claim 16.

Regarding claims 16, copending claim 20 recites detection of a residue within contact openings.

Regarding claim 17, copending claim 15 requires negatively precharging the surface of the sample.

Regarding claims 18 and 27, copending claim 172 recites all the material limitations of the claim and is substantially similar to the method of claim 1 and the method of copending claim 1. Note the explanation of the sample "map" as applied to claim 1 above and claim 10 above for the explanation regarding the semiconductor wafer limitation.

Regarding claim 19, note the explanation of claim 2 above.

Regarding claims 22 and 23, copending claim 177 addresses the adaptation of the controller to monitor uniformity. Note the explanation of claims 5 and 6 above.

Regarding claim 21, note copending claim 172 and the explanation regarding claim 4 above.

Regarding claims 30 and 31, note copending claim 179 and the explanation of claims 13 and 14 above.

Regarding claim 32, note copending claim 1 and the rationale applied to claim 15.

Regarding claim 33, note copending claim 20 and the rationale applied to claim 16.

Regarding claim 34, note copending claim 15 and the rationale applied to claim 17 above.

Regarding claims 35 and 36, note copending claim 1 where the assessed characteristic is the positions of the first and second layers of copending claim 1. If the positions of the first and second layers are known, their alignments are known and they are therefore "mapped."

Regarding claims 37 and 38, apply the rationale give above for claims 35 and 36 using copending claim 172.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-13, 15-30, and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al. (USPN 6,768,324 B1).

Yamada et al. teaches a device and method corresponding to the following claims:

Regarding claims 1 and 18, the claims recite method and device where the method claim (1) restates the functional language associated with the elements of the apparatus claim (18). Both will be treated simultaneously.

Claims 1 and 18: Yamada et al. teaches a method and apparatus for testing a sample having a first layer (Fig. 16A Item 42) that is at least partly conductive and a second layer (Fig. 16A Item 41) formed over the first layer, following production of contact openings in the second layer, the apparatus comprising: a particle beam (Fig. 2 Item 1) source adapted to direct a beam of charged particles along a beam axis that deviates substantially in angle from a normal to a surface of the sample (Fig. 16A Note inclination of beam relative to sample), so as to irradiate one or more of the contact openings in each of a plurality of locations distributed over at least a region of the sample (Col. 5 Lines 1-11 where all locations within a measuring region are irradiated); a current measuring device (Fig. 16A Item 9) adapted to measure a specimen current flowing through the first layer in response to irradiation of the one or more of the contact openings at each of the plurality of locations; and a controller (Fig. 2 Items 10 and 11) adapted to create a map of at least the region of the sample indicating the specimen current measured in response to the irradiation at the plurality of locations (Note Col. 6 Lines 6-24 describing the mapping of detected current information).

Yamada et al. further fails to teach in regards to claims 1 and 18 that a "deviation in angle [of a primary electron beam] is greater than arc tan (1/AR), wherein AR is the ratio of depth to diameter of the one or more contact openings."

The newly added limitation to claims 1 and 18 explicitly defines a minimum incident angle of the primary electron beam on the contact opening under test. Since Yamada et al. teaches a device which inspects a contact opening in the manner set forth in claims 1 and 18, and its associated method of use, this newly added limitation attempts to explicitly define that which is encompassed in the teaching of Yamada et al.

For example, at Col. 23-24, its is taught that the beam may be deflected to be tilted as it is incident on the sample, and for causing a greater deviation from the surface normal of the sample, the stage support of the sample tilts as well to accommodate the required range of observation of the contact hole. Note further Fig. 16A and 54.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to inspect a sample with an electron beam where a "deviation in angle [of a primary electron beam] is greater than arc tan (1/AR), wherein AR is the ratio of depth to diameter of the one or more contact openings"

in order to inspect the sidewalls, bottom, and peripheral region adjoining the two (Note Fig. 16A-B) of cylindrical or tapered contact openings to provide information on the geometry of the contact opening and any residues left therein, thereby evaluating the quality of a contact hole manufacturing process.

Regarding claims 2 and 19, the claims the claims recite method and device where the method claim (2) restates the functional language associated with the elements of the apparatus claim (19). Both will be treated simultaneously.

Claims 2 and 19: The method and apparatus further comprising means for measuring (Fig. 16A Item 33) a secondary electron current (Fig. 16A Item 32) emitted from the sample responsive to the beam of charged particles, and wherein creating the map comprises mapping the secondary electron current together with the specimen current. (Note Col. 23 Lines 40-58 and Col. 8 Lines 6-10 where the measured current is defined as the secondary electron current and the specimen current).

Regarding claims 3 and 20, the claims the claims recite method and device where the method claim (3) restates the functional language associated with the elements of the apparatus claim (20). Both will be treated simultaneously.

Claims 3 and 20: The apparatus and method further comprising directing the beam of charged particles toward one or more reference locations that are adjacent to at least one of the plurality of locations of the irradiated contact openings, and wherein measuring the specimen current comprises measuring reference values of the specimen current in response to the irradiation of the reference locations, and wherein creating the map comprises subtracting the reference values from the specimen current measured in response to the irradiation of the contact openings to generate subtracted current values, and using the subtracted current values in creating the map.

Yamada et al. teaches the preceding limitation at Col. 6. The control (data processing) means of Yamada et al. performs a subtraction step during comparison. Note Col. 6 Lines 18-25 where comparing comprises examining a difference between a reference region current and another region's current. By analyzing the difference between two values, the data processing means must subtract them relative to another, hence difference.

Regarding claims 4 and 21, the claims recite method and device where the method claim (4) restates the functional language associated with the elements of the apparatus claim (21). Both will be treated simultaneously.

Claims 4 and 21: The method and apparatus wherein creating the map comprises assessing, based on the map, at least one of a characteristic depth and a characteristic width of the contact openings at each of the plurality of locations.

Yamada et al. teaches that the map is generated utilizing measured current values (Col. 6 Lines 15-19), and further teaches that the same measured current data is indicative of a feature (contact opening) on a sample having height and width (Col. 5 Lines 24-48, esp. lines 43-48). Therefore the map assesses features of the contact openings on the sample in Yamada et al. Note further paragraph 20 Lines 15-38 on Map Display.

Regarding claims 5-7 and 22-24, the claims recite method and device where the method claims (5-7) restate the functional language associated with the elements of the apparatus claims (22-24). Both sets will be treated simultaneously.

Claims 5 and 22: The method and apparatus further comprising wherein creating the map comprises assessing, based on the map, non-uniformities in a process used to create the contact openings.

Yamada et al. teaches at Col. 20 Line 39 through Col. 21 Line 53 that non-uniformities are assessed using the displayed map.

Claims 6 and 23: The method and apparatus further comprising wherein assessing the non-uniformities comprises assessing variations over the region of the sample.

Yamada et al. teaches that variations over the sample are assessed at Col. 21 Lines 17-42.

Claims 7 and 24: The method and apparatus further comprising wherein assessing the non-uniformities comprises assessing variations between different, first and second samples.

Yamada et al. teaches the assessment of variations between different first and second samples at Col. 21 Lines 43-54.

Regarding claims 8 and 25, the claims recite method and device where the method claim (8) restates the functional language associated with the elements of the apparatus claim (25). Both sets will be treated simultaneously.

Claims 8 and 25: The method and apparatus further comprising applying corrective action to the process responsively to the map.

Yamada et al. teaches that the map is used to identify defects in an etch process responsively to the measurement information gained from the map (Col. 21 Lines 47-53).

Regarding claims 9 and 26, the claims recite method and device where the method claim (9) restates the functional language associated with the elements of the apparatus claim (26). Both sets will be treated simultaneously.

Claims 9 and 26: The method and apparatus further comprising wherein creating the map comprises assessing, based on the map, an alignment between the contact openings in the second layer and a structure in the first layer.

Yamada et al. teaches a means and method for using said means to determine the deviation of a multi-layer pattern formed in respective layers of a sample (Col. 7 Line 65 through Col. 8 Line 5) which comprises the assessment of alignment of features in the layers of a sample. Note Fig. 66.

Regarding claims 10 and 27, the claims recite method and device where the method claim (10) restates the functional language associated with the elements of the apparatus claim (27). Both sets will be treated simultaneously.

Claims 10 and 27: The method and apparatus further comprising wherein the sample comprises a semiconductor wafer.

Yamada et al. teaches that a sample is a semiconductor wafer at Col. 3 Lines 45-51.

Regarding claims 11 and 28, the claims recite method and device where the method claim (11) restates the functional language associated with the elements of the apparatus claim (28). Both sets will be treated simultaneously.

Claims 11 and 28: The method and apparatus further comprising wherein at least some of the locations are located on different dies of the wafer.

Dies correspond to different regions on a wafer etched as individual semiconductor chips. Yamada et al. teaches in Fig. 41 the assessment of different chip regions on a wafer using the process and apparatus above.

Regarding claims 12 and 29, the claims recite method and device where the method claim (12) restates the functional language associated with the elements of the apparatus claim (29). Both sets will be treated simultaneously.

Claims 12 and 29: The method and apparatus further comprising wherein directing the beam of charged particles comprises selecting the locations to irradiate such that the one or more of the contact openings in each location among the plurality of locations are characteristic of the contact openings in a respective area of the location.

Yamada et al. at Col. 21 Lines 17-42 teaches that selective regions of a sample wafer are examined to be indicia of the etch process which produced the contact openings on the entirety of the wafer.

Regarding claims 13 and 30, the claims recite method and device where the method claim (13) restates the functional language associated with the elements of the apparatus claim (30). Both sets will be treated simultaneously.

Claims 13 and 30: The method and apparatus further comprising wherein at least one of the contact openings is a contact hole.

Yamada et al. teaches that the contact openings are contact holes (Col. 3 Lines 45-51).

Regarding claims 15 and 32, the claims recite method and device where the method claim (15) restates the functional language associated with the elements of the apparatus claim (32). Both sets will be treated simultaneously.

Claims 15 and 32: The method and apparatus further comprising wherein the contact openings have side walls and a bottom, and wherein directing the beam of charged particles comprises angling the beam so that more of the charged particles strike the side walls than strike the bottom. (Note Fig. 54 of Yamada et al.)

Regarding claims 16 and 33, the claims recite method and device where the method claim (16) restates the functional language associated with the elements of the apparatus claim (33). Both sets will be treated simultaneously.

Claims 16 and 33: The method and apparatus further comprising wherein creating the map comprises assessing, based on the map, whether a contaminant residue is present within the contact openings. Note Fig. 19A, 19B, 20A, and 20B Items 71 and 72.

Regarding claims 17 and 34, the claims recite method and device where the method claim (17) restates the functional language associated with the elements of the apparatus claim (34). Both sets will be treated simultaneously.

Claims 17 and 34: The method and apparatus further comprising negatively precharging the surface of the sample in proximity the contact openings, so as to facilitate measurement of the specimen current. Yamada et al. teaches at Col. 26 Lines 19-38 teaches that the electron beam is irradiated on the sample surface near the contact openings prior to irradiation of the contact openings.

Claims 14 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al. (USPN 6,768,324 B1).

Yamada et al. teaches all the limitations recited in claim 1 as pointed out above and further teaches that in determining the three dimensional arrangement of features of a sample, a two-fold technique is used. Firstly, secondary electrons emitted from the surface are indicative of the position of a contact opening (Note Fig. 4a and 4b). Secondly a compensation current is measured by determining a beam current transmitted through the sample (Note Fig. 6a and 6b), where this method is outlined well at Col. 5 of the Yamada et al. patent. Another key point taught in Yamada is that it is the rising and falling of the secondary electron signal and the compensation current signal which indicates the three dimensional arrangement of features on and inside a specimen.

Yamada et al. fails to disclose a contact opening in the form of a trench, but at column 5 teaches other three dimensional features such as a "pillar", apparently a cylindrical hole, and a frustrum, or cone.

Modifying the contact openings of Yamada et al. from a "pillar" or cone configuration to a trench shape as required in claims 14 and 31, constitutes a change of shape of the contact opening recited in the prior art.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the contact openings of Yamada et al. to a "trench" shape because it has been held that a change in shape is an obvious modification of the prior art so long as no new and unexpected result is achieved (Note: In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966)). In the instant case, the configuration of the feature being examined does not materially alter the method used or the device for performing

said measurement, but the outcome of the measurement process employed. For example, Fig. 19A and 19B illustrate the test process in Yamada et al. for the "pillar" shaped contact opening, while Fig. 20A and 20B illustrate testing of a cone shaped contact opening. The test outcomes are illustrated in Figs. 19B and 20B, and show that different three dimensional test contact openings produce different results, but not unexpectedly so given the teaching of Yamada et al. pointed out above. In the instant case, no new and unexpected result is being achieved by providing a different shape to be examined, hence the provision of a trench shaped contact opening is an obvious modification of Yamada et al.

Claims 35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al. (USPN 6,768,324 B1).

Yamada et al. teaches an apparatus and method as pointed out above which comprises a particle beam source, a current measuring device for measuring current transmitted through a sample, a secondary electron detector for detecting secondary electrons, and a controller to process the detected current and secondary electron signals and create a three dimensional map of a sample under test. Yamada et al. further teaches in Fig. 59A and 59B a sample having a first layer 241 having a structure 242 formed therein, and a second layer 243 having a contact hole formed therein where the inspection apparatus and method assess the positions of both features within their layers on the sample (Col. 39 Lines 1-17).

Yamada et al. fails to disclose a sample having a plurality of structures in a first layer and a plurality of contact holes in a second layer.

Where Yamada et al. teaches the case where there is one structure and contact hole, providing a plurality of contact holes and structures is a duplication, or making plural, that which is disclosed in Yamada et al.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to duplicate the example illustrated in Fig. 59A and 59B of Yamada et al. because in the instant application, no new and unexpected result is achieved by repeating that which is taught by Yamada et al. Note In re Harza, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

As pointed out above, Yamada et al. renders claims 35 and 37 unpatentable.

Yamada et al. further fails to teach in regards to claims 35 and 37 that a "deviation in angle [of a primary electron beam] is greater than arc tan (1/AR), wherein AR is the ratio of depth to diameter of the one or more contact openings."

The newly added limitation to claims 35 and 37 explicitly defines a minimum incident angle of the primary electron beam on the contact opening under test. Since Yamada et al. teaches a device which inspects a contact opening in the manner set forth in claims 35 and 37, and its associated method of use, this newly added limitation attempts to explicitly define that which is encompassed in the teaching of Yamada et al.

For example, at Col. 23-24, its is taught that the beam may be deflected to be tilted as it is incident on the sample, and for causing a greater deviation from the surface

normal of the sample, the stage support of the sample tilts as well to accommodate the required range of observation of the contact hole. Note further Fig. 16A and 54.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to inspect a sample with an electron beam where a "deviation in angle [of a primary electron beam] is greater than arc tan (1/AR), wherein AR is the ratio of depth to diameter of the one or more contact openings" in order to inspect the sidewalls, bottom, and peripheral region adjoining the two (Note Fig. 16A-B) of cylindrical or tapered contact openings to provide information on the geometry of the contact opening and any residues left therein, thereby evaluating the quality of a contact hole manufacturing process.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Vanore whose telephone number is (571) 272-2483. The examiner can normally be reached on M-F 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (571) 272-2477. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dav

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